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EXAMINER

WON, MICHAEL YOUNG

ART UNIT

PAPER NUMBER

2155

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/755,479

Applicant(s)

LEE, WHAY S.

Examiner

Michael Y. Won

Art Unit

2155

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 June 2005.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6,9-29,32-42,44-63,65,66,68,70 and 71 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-6,9-29,32-42,44-63,65,66,68,70 and 71 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1, 2, 22, 24, 39, 44, 53, 56, 59, 63, 66, and 68 have been amended.
2. Claims 64, 67, and 69 have been cancelled.
3. Claims 1-6, 9-29, 32-41, 44-63, 65, 66, 68, and 70 have been examined and are pending with this action.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 9, 16, 18-25, 32, 37-39, and 41-46 are rejected under 35 U.S.C. 102(b) as being anticipated by Annapareddy et al. (US 5,602,839 A).

INDEPENDENT:

As per **claim 1**, Annapareddy teaches a method of sending a message in an interconnection fabric, wherein the interconnection fabric couples together a plurality of nodes (see Fig.2), wherein each node of the plurality of nodes comprises a plurality of input ports and a plurality of output ports (see col.1, lines 19-22), comprising: for each of

Art Unit: 2155

a plurality of messages (see col.10, lines 13-14: "for each message"): dynamically selecting a route in the interconnection fabric from among a plurality of independent routes (see Fig.2) for sending the message from a sending node to a destination node (see col.2, lines 34-39), wherein said dynamically selecting a route comprises identifying a routing directive for the selected one of the plurality of independent routes from the sending node to the destination node (see col.3, lines 7-31 and col.10, lines 30-53); wherein said dynamically selecting a route comprises selecting different ones of the independent routes from the sending node to the destination node for at least two of the messages (implicit: see col.10, lines 42-46); encoding the routing directive in the message, wherein the routing directive describes the route and comprises at least one segment, wherein each segment comprises a direction component and a distance component (see Fig.4; Fig.10; and col.6, lines 9-27); sending (see col.8, lines 6-11) the message on one of the output ports of the sending node (see col.1, lines 19-22 and col.6, lines 3-8); receiving the message on one of the input ports of a first node connected to the output port of the sending node (see col.1, lines 19-22 and col.6, lines 3-8); decrementing the distance component for a current segment of the routing directive (see col.4, lines 14-20 and col.11, lines 45-50); selecting (see col.8, lines 6-11) one of the output ports of the first node according to the current segment of the routing directive in the message (see col.1, lines 19-22 and col.6, lines 3-8); and sending (see col.8, lines 6-11) the message on the selected one of the output ports of the first node (see col.1, lines 19-22 and col.6, lines 3-8).

As per **claim 22**, Annapareddy teaches of a node comprising: a routing unit (see Fig.3); a plurality of input ports (see col.1, lines 19-22 and col.6, lines 3-8); and a plurality of output ports (see col.1, lines 19-22 and col.6, lines 3-8); wherein the node is configured to be connected to an interconnection fabric, wherein the interconnection fabric is configured to connect the node to a plurality of nodes (see Fig.2); wherein the routing unit is configured to receive a message being sent along a route from a sending node to a destination node in the interconnection fabric (see col.6, lines 3-8); wherein the routing unit is further configured to receive a routing directive encoded in the message, wherein the routing directive describes the route and comprises at least one segment, and wherein a segment comprises a direction component and a distance component (see Fig.4; Fig.10; and col.6, lines 9-27); wherein the node is configured to receive the message on one of the input ports when the node is not the sending node (see col.1, lines 19-22 and col.6, lines 3-8), wherein the node is further configured to decrement the distance component of a current segment of the routing directive (see col.4, lines 14-20 and col.11, lines 45-50) and to select (see col.8, lines 6-11) one of the output ports according to the current segment (see col.9, lines 1-23); wherein, when the node is the sending node, the node is further configured to dynamically select a route from among a plurality of independent routes (see Fig.2) from the sending node to the destination node (see col.2, lines 34-39; col.3, lines 7-31; and col.10, lines 30-53), and wherein the node is configured to encode the routing directive for the dynamically selected route in a message (see Fig.4; Fig.10; and col.6, lines 9-27), and wherein the node is configured to send the message on one of the output ports (see col.1, lines 19-

22 and col.6, lines 3-8); wherein for at least two messages, the node is further configured to dynamically select different ones of the independent routes from the sending node to the destination node when the node is the sending node (implicit: see col.10, lines 42-46).

As per **claim 39**, Annapareddy teaches of a device comprising: an interface configured to communicate with a source node in an interconnection fabric (see Fig.3), wherein the interconnection fabric comprises a plurality of routes between the source node and a destination node (see Fig.2); and a controller configured to provide a first routing directive describing a first route from the source node to the destination node (col.3, lines 7-31 and col.10, lines 30-53), wherein the routing directive comprises at least one segment, wherein each segment comprises a distance component and a direction component (see Fig.4; Fig.10; and col.6, lines 9-27), wherein the distance component is configured to be decremented by a receiving node (see col.4, lines 14-20 and col.11, lines 45-50); wherein the controller is further configured to encode the first routing directive in a message, and to communicate the message to the source node to be sent on the interconnection fabric to the destination node (see Fig.4; Fig.10; and col.6, lines 9-27); and wherein the controller is further configured to maintain a routing table comprising a plurality of independent routes from the source node to the destination node (see col.3, lines 1-6), and wherein the controller is further configured to dynamically select the first routing directive from the routing table when communicating the message to the source node to be sent on the interconnection fabric to the destination node (see col.2, lines 34-39; col.3, lines 7-31; and col.10, lines 30-53).

DEPENDENT:

As per **claims 9 and 32**, Annapareddy further teaches wherein the interconnection fabric is a torus interconnection fabric (see col.4, lines 48-51).

As per **claims 16 and 45**, Annapareddy further teaches wherein a first number of segments of a first routing directive differ from a second number of segments of a second routing directive ((implicit: see col.10, lines 42-46)).

As per **claim 18**, Annapareddy further teaches wherein each direction component comprises a direction relative to a routing direction the message was traveling in when received (see Fig.5, Fig.6, Fig.10, and Fig.11).

As per **claim 19**, Annapareddy does not explicitly teach wherein each direction component comprises an identifier of one of the output ports of one of the nodes, but such limitations are inherent.

As per **claims 20, 21, 37, 38, and 42**, Annapareddy further teaches wherein the destination node is configured to communicate with a storage device comprising a disk drive (see Fig.3 and Fig.9).

As per **claim 24**, Annapareddy further teaches wherein the node is configured to communicate with a device on a device port, wherein the device is configured to select a route, encode a routing directive in the message and communicate a message to the node on the device port when the node is the sending node (see col.5, line 60-col.6, line 8).

As per **claim 25**, Annapareddy further teaches wherein the node is further configured to select one of the output ports according to the current segment (see col.9, lines 1-23).

As per **claim 41**, Annapareddy further teaches wherein the controller comprises a host interface configured to communicate with a host computer (inherent).

As per **claim 44**, Annapareddy further teaches wherein the routing table further comprises a second routing directive describing a second route from the source node to the destination node (see Fig.5, Fig.6, Fig.10, and Fig.11).

As per **claim 46**, Annapareddy further teaches wherein the controller is further configured to calculate the first routing directive (see col.6, lines 28-40).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 2-6, 17, and 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Annapareddy et al. (US 5,602,839 A) in view of Nugent (US 5,175,733 A).

As per **claims 2, 5, and 26**, Annapareddy further teaches wherein said selecting one of the output ports by the node comprises: if, after said decrementing, the distance component for the current segment is greater than zero, selecting the output port corresponding to a same routing direction in which the message was traveling when received (see col.4, lines 14-24).

Annapareddy does not explicitly teach if, after said decrementing, the distance component for the current segment is zero, selecting the output port corresponding to the direction component of the current segment. Nugent teaches of if, after said decrementing, the distance component for the current segment is zero, selecting the output port corresponding to the direction component of the current segment (see Fig.8 and col.14, line 1-col.15, line 14).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ the teachings of Nugent within the system of Annapareddy by implementing selecting an output port corresponding to the direction component of the current segment when the current segment is zero within method of sending a message in an interconnection fabric because by decrementing the directional component to zero allows directional limits to be set thereby triggering a change in directions such as from X-direction to Y or Z-direction.

As per **claims 3 and 27**, Nugent further teaches wherein if, after said decrementing, the distance component for the current segment is zero, and the output port is selected according to the direction component of the current segment, the method further comprises removing by the node the current segment from the routing

directive so that a next segment becomes the current segment when the message is sent on the selected output port (inherent).

As per **claims 4 and 28**, Annapareddy further teaches wherein the routing directive further comprises a pointer to the current segment, and wherein said removing the current segment comprises moving the pointer to the next segment (inherent).

As per **claim 6**, Annapareddy further teaches wherein the subsequent node selecting a port corresponding to the direction component comprises: selecting the corresponding output port if the direction component for the current segment specifies a routing direction; and selecting a device port if the direction component for the current segment specifies that the subsequent node is the destination for the message (see col.7, lines 53-56 and col.9, lines 1-23).

As per **claim 17**, Annapareddy teaches of further comprising a subsequent node receiving the message and, if all of the segments of the routing directive have been removed, the subsequent node identifying itself as the destination node (see col.7, lines 49-65) and selecting a device port (inherent).

As per **claim 29**, Annapareddy further teaches wherein the node is configured to select: one of the output ports corresponding to a same routing direction in which the message was traveling when received if, after said decrementing, the distance component for the current segment is greater than zero (see col.4, lines 14-24); and a device port if, after said decrementing, the distance component for the current segment is zero and if the direction component for the current segment identifies that the node is

Art Unit: 2155

the destination node (see col.9, lines 58-66). (**NOTE:** the appropriate port is inherently selected from the routing tables: see col.3, lines 7-12 and col.6, lines 3-8).

Annapareddy does not explicitly teach of selecting one of the output ports corresponding to the direction component of the current segment if, after said decrementing, the distance component for the current segment is zero, and if the direction component for the current segment does not identify that the node is the destination node. Nugent teach of selecting one of the output ports corresponding to the direction component of the current segment if, after said decrementing, the distance component for the current segment is zero, and if the direction component for the current segment does not identify that the node is the destination node (see claim 2 rejection above).

6. Claims 10-13, 33-35, and 47-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Annapareddy et al. (US 5,602,839 A) in view of Walker et al. (US 5,613,069 A).

As per **claims 10 and 33**, Although Annapareddy teaches of routing directive comprising at least one segment, wherein each segment comprises a direction component and a distance component (see claim 1 rejection above), Annapareddy does not explicitly teach of further comprising: if the node is the sending node, identifying a return route from the destination node to the sending node; and encoding a return routing directive in the message. Walker teaches of further comprising: if the node is the sending node, identifying a return route from the destination node to the sending node;

and encoding a return routing directive in the message (see col.5, lines 20-26; col.7, lines 2-5; and col.8, lines 15-23).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ the teachings of Walker within the system of Annapareddy by implementing identifying a return route from the destination node to the sending node and encoding a return routing directive in the message within method of sending a message in an interconnection fabric because such implementation allows the destination node to return messages back to the source node. Messages such as an acknowledgement message and error messages. Furthermore, Annapareddy teaches of informing the source (reverse routing) of undelivered messages (see col.8, lines 11-15).

As per **claims 11 and 34**, Walker teaches of further comprising if the node is the sending node, the routing unit is further configured to calculate the return routing directive (see col.23, lines 38-40).

As per **claims 12 and 35**, Walker further teaches wherein the interconnection fabric is bi-directional, and wherein calculating the return routing directive comprises reversing the routing directive (see col.8, lines 21-23).

As per **claims 13 and 47**, Walker teaches of further comprising wherein the controller is further configured to incrementally encode a return routing directive in the message, wherein the return routing directive describes a return route from the destination node to the sending node and comprises at least one segment, and wherein

Art Unit: 2155

each segment comprises a direction component and a distance component (see col.5, lines 20-25).

As per **claim 48**, Annapareddy and Walker further teach wherein the controller is further configured to select the return routing directive (see claim 10 rejection above) from a routing table (see Annapareddy: col.3, lines 7-12).

As per **claim 49**, Walker further teaches wherein the controller is further configured to calculate the return routing directive from the first routing directive (see col.8. lines 21-23).

As per **claim 50**, Annapareddy and Walker further teaches wherein the controller is further configured to encode a return routing direction describing a return route from the destination node to the source node in the message, and wherein the return routing directive is configured to be incrementally added to, as the message is routed to the destination node (see claim 10 rejection above).

As per **claim 51**, Annapareddy and Walker further teaches wherein the return routing directive is further configured to return an error message to the source node if a routing error is encountered (see col.9, lines 57-62).

As per **claim 52**, Annapareddy and Walker further teaches wherein the controller is further configured to use the incrementally created return routing directive to locate the routing error if an error message is returned, wherein the incrementally created return routing directive indicates a last node that successfully received the message (see col.9, lines 57-62).

7. Claims 36 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Annapareddy et al. (US 5,602,839 A) in view of Otterness et al. (US 6,792,472 B1).

As per **claims 36 and 40**, Annapareddy does not explicitly teach wherein the node is configured to communicate with a controller that is a RAID controller. Otterness teaches of nodes configured to communicate with a controller that is a RAID controller (see col.8, lines 4-14). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ the teachings of Otterness within the system of Annapareddy by implementing a RAID controller for communicating with nodes because Otterness teaches that RAID controllers can be employed as “intelligent data routers” (see col.1, lines 10-12).

8. Claims 53-62, 68, and 70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Flaig et al. (US 5,105,424 A) in view of Walker et al. (US 5,613,069 A).

INDEPENDENT:

As per **claim 53**, Flaig teaches a method of sending a message in an interconnection fabric, wherein the interconnection fabric couples together a plurality of nodes, wherein each node of the plurality of nodes comprises a plurality of input ports and a plurality of output ports (see abstract and col.1, lines 46-61), comprising: identifying a route in the interconnection fabric for sending the message from a sending node to a destination node (see col.1, lines 50-61); encoding (see col.6, lines 14-15) a routing directive in the message, wherein the routing directive describes the route and

Art Unit: 2155

comprises at least one segment, wherein each segment comprises a direction component (see col.4, lines 55-57) and a distance component (see col.7, lines 27-33 & 41-48); sending the message on one of the output ports of the sending node (see col.4, lines 57-60 and col.7, lines 12-16); receiving the message on one of the input ports of a first node connected to the output port of the sending node (inherent); decrementing the distance component for a current segment of the routing directive (see col.7, lines 50-52); selecting one of the output ports of the first node according to the current segment of the routing directive in the message (see Figs.4-6; col.6, lines 55-57; and col.7, lines 19-27); and sending the message on the selected one of the output ports of the first node (see col.4, lines 57-60 and col.7, line 68 to col.8, line 2).

Flaig does not explicitly teach of identifying a return route from the destination node to the sending node; encoding a return routing directive in the message, wherein the message includes both the routing directive and the return directive when sent from the initial sending node, wherein the return routing directive describes the return route and comprises at least one segment, wherein each segment comprises a direction component and a distance component.

Walker teaches of identifying a return route from the destination node to the sending node (see col.29, lines 40-49); encoding a return routing directive in the message, wherein the message includes both the routing directive and the return directive when sent from the initial sending node (see col.5, lines 20-25: "packet header and trailer" and col.7, lines 62-64), wherein the return routing directive describes the return route and comprises at least one segment (see col.5, lines 20-26; col.7, lines 2-5;

and col.8, lines 15-23), wherein each segment comprises a direction component and a distance component (inherent as applied to Flaig reference).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ the teachings of Walker within the system of Flaig by implementing identifying a return route from the destination node to the sending node; encoding a return routing directive in the message, wherein the message includes both the routing directive and the return directive when sent from the initial sending node, wherein the return routing directive describes the return route and comprises at least one segment, wherein each segment comprises a direction component and a distance component within method of sending a message in an interconnection fabric because such implementation allows the destination node to return messages back to the source node. Messages such as an acknowledgement message taught by Flaig (see col.4, lines 2-5 and col.9, lines 57-66).

As per **claim 56**, Flaig teaches of a node comprising: a routing unit (see col.1, lines 50-61 and col.4, lines 51-52); a plurality of input ports (see Figs.4-6 and col.1, lines 46-55); and a plurality of output ports (see Figs.4-6 and col.1, lines 46-55); wherein the node is configured to be connected to an interconnection fabric, wherein the interconnection fabric is configured to connect the node to a plurality of nodes (see col.4, lines 51-55); wherein the routing unit is configured to receive a message being sent along a route from a sending node to a destination node in the interconnection fabric (see col.4, lines 55-57 and col.7, lines 33-37); wherein the routing unit is further configured to receive a routing directive encoded (see col.6, lines 14-15) in the

Art Unit: 2155

message, wherein the routing directive describes the route and comprises at least one segment, and wherein a segment comprises a direction component (see col.4, lines 55-57) and a distance component (see col.7, lines 27-33 & 41-48); and wherein the node is configured to receive the message on one of the input ports when the node is not the sending node (see col.4, lines 51-60), wherein the node is further configured to decrement the distance component of a current segment of the routing directive (see col.7, lines 50-52) and to select one of the output ports according to the current segment (see col.4, lines 57-60 and col.7, line 68 to col.8, line 2).

Flaig does not explicitly teach wherein, when the node is the sending node, the routing unit is further configured to identify a return route from the destination node to the sending node and to encode a return routing directive in the message, wherein the return routing directive describes the return route and comprises at least one segment, wherein each segment comprises a direction component and a distance component, wherein the message includes both the routing directive and the return routing directive when sent from the initial sending node (see claim 53 rejection above).

As per **claim 59**, Flaig teaches of a device comprising: an interface configured to communicate with a source node in an interconnection fabric (see col.4, lines 63-66), wherein the interconnection fabric comprises a plurality of routes between the source node and a destination node (see Fig.8 and col.7, line 41 to col.8, lines 4); and a controller configured to provide a first routing directive describing a first route from the source node to the destination node (see col.4, lines 51-52), wherein the routing directive comprises at least one segment, wherein each segment comprises a distance

component (see col.7, lines 27-33 & 41-48) and a direction component (see col.4, lines 55-57), wherein the distance component is configured to be decremented by a receiving node (see col.7, lines 50-52); and wherein the controller is further configured to encode (see col.6, lines 14-15) the first routing directive in a message, and to communicate the message to the source node to be sent on the interconnection fabric to the destination node (see col.7, line 41 to col.8, lines 4).

Flaig does not explicitly teach wherein the controller is further configured to provide a return routing directive describing a return route from the destination node to the source node, wherein the return routing directive comprises at least one segment, wherein each segment comprises a direction component and a distance component; and wherein the controller is further configured to encode the return routing directive in the message, wherein the message includes both the routing directive and the return routing directive when sent from the initial sending node (see claim 53 rejection above).

As per **claim 68**, Flaig teaches of a device comprising: an interface configured to communicate with a source node in an interconnection fabric (see col.4, lines 63-66), wherein the interconnection fabric comprises a plurality of routes between the source node and a destination node (see Fig.8 and col.7, line 41 to col.8, lines 4); and a controller configured to provide a first routing directive describing a first route from the source node to the destination node (see col.4, lines 51-52), wherein the routing directive comprises at least one segment, wherein each segment comprises a distance component (see col.7, lines 27-33 & 41-48) and a direction component (see col.4, lines 55-57), wherein the distance component is configured to be decremented by a receiving

node (see col.7, lines 50-52); and wherein the controller is further configured to encode (see col.6, lines 14-15) the first routing directive in a message, and to communicate the message to the source node to be sent on the interconnection fabric to the destination node (see col.7, line 41 to col.8, lines 4).

Flaig does not explicitly teach wherein the controller is further configured to incrementally encode a return routing directive describing a return route from the destination node to the source node in the message, wherein the return routing directive describes a return route from the destination node to the sending node and comprises at least one segment, and wherein each segment comprises a direction component and a distance component, and wherein the return routing directive is configured to be incrementally added to as the message is routed to the destination node, wherein the return routing directive is further configured to be used to return an error message to the source node if a routing error is encountered.

Walker teaches wherein the controller is further configured to incrementally encode a return routing directive describing a return route from the destination node to the source node in the message (see col.5, lines 20-25: "packet header and trailer"), wherein the return routing directive describes a return route from the destination node to the sending node and comprises at least one segment (see col.5, lines 20-26; col.7, lines 2-5; and col.8, lines 15-23), and wherein each segment comprises a direction component and a distance component (inherent as applied to Flaig reference), and wherein the return routing directive is configured to be incrementally added to as the message is routed to the destination node (see col.5, lines 20-25), wherein the return

Art Unit: 2155

routing directive is further configured to be used to return an error message to the source node if a routing error is encountered (see col.2, lines 42-44).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ the teachings of Walker within the system of Flaig by implementing encoding a return routing directive in the message, wherein the return routing directive describes the return route and comprises at least one segment, wherein each segment comprises a direction component and a distance component, wherein the return routing directive is configured to be incrementally added to as the message is routed to the destination node, wherein the return routing directive is further configured to be used to return an error message to the source node if a routing error is encountered within method of sending a message in an interconnection fabric because such implementation allows the destination node to return messages back to the source node. Messages such as an acknowledgement message taught by Flaig (see col.4, lines 2-5 and col.9, lines 57-66).

DEPENDENT:

As per **claims 54 and 57**, Walker teaches of further comprising if the node is the sending node, the routing unit is further configured to calculate the return routing directive (see claim 53 rejection above).

As per **claims 55 and 58**, Walker further teaches wherein the interconnection fabric is bi-directional, and wherein calculating the return routing directive comprises reversing the routing directive (see claim 53 rejection above).

As per **claim 60**, Flaig and Walker further teaches wherein the controller is further configured to select the return routing directive from a routing table (see col.4, lines 46-62).

As per **claim 61**, Flaig and Walker further teaches wherein the controller is further configured to calculate the return routing directive from the first routing directive (see col.4, lines 46-62).

As per **claim 62**, Flaig and Walker further teaches wherein the return routing directive is further configured to return an error message to the source node if a routing error is encountered (see col.9, lines 57-62).

As per **claim 70**, Flaig and Walker further teaches wherein the controller is further configured to use the incrementally created return routing directive to locate the routing error if an error message is returned, wherein the incrementally created return routing directive indicates a last node that successfully received the message (see col.9, lines 57-62).

9. Claims 10-13, 33-35, and 47-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Annapareddy et al. (US 5,602,839 A) in view of Walker et al. (US 5,613,069 A) and Nugent (US 5,175,733 A).

As per **claim 14**, Annapareddy and Walker do not explicitly teach wherein incrementally encoding comprises: incrementing the distance component for a current segment of the return routing directive; wherein if, after said decrementing, the distance component for the current segment of the routing directive is zero, the method further

comprises modifying the direction component of a current segment of the return routing directive and adding a new segment to the return routing directive so that the new segment becomes the current segment of the return routing directive when the message is sent on the selected output port. Nugent teaches such means (see claims 1, 2, and 10 rejections above).

As per **claim 15**, Annapareddy and Walker further teaches wherein the return routing directive further comprises a pointer to the current segment, wherein adding a new segment to the return routing directive further comprises moving the pointer to the new segment (see claim 4 rejection above).

10. Claims 63, 65, and 66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Flaig et al. (US 5,105,424 A) in view of Walker et al. (US 5,613,069 A) and Nugent (US 5,175,733 A).

As per **claim 63**, Flaig teaches a method of sending a message in an interconnection fabric, wherein the interconnection fabric couples together a plurality of nodes, wherein each node of the plurality of nodes comprises a plurality of input ports and a plurality of output ports (see abstract and col.1, lines 46-61), comprising: identifying a route in the interconnection fabric for sending the message from a sending node to a destination node (see col.1, lines 50-61); encoding (see col.6, lines 14-15) a routing directive in the message, wherein the routing directive describes the route and comprises at least one segment, wherein each segment comprises a direction component (see col.4, lines 55-57) and a distance component (see col.7, lines 27-33 &

41-48); sending the message on one of the output ports of the sending node (see col.4, lines 57-60 and col.7, lines 12-16); receiving the message on one of the input ports of a first node connected to the output port of the sending node (inherent); decrementing the distance component for a current segment of the routing directive (see col.7, lines 50-52); selecting one of the output ports of the first node according to the current segment of the routing directive in the message (see Figs.4-6; col.6, lines 55-57; and col.7, lines 19-27); and sending the message on the selected one of the output ports of the first node (see col.4, lines 57-60 and col.7, line 68 to col.8, line 2).

Flaig does not explicitly teach of incrementally encoding a return routing directive in the message, wherein the return routing directive describes a return route from the destination node to the sending node and comprises at least one segment, and wherein each segment comprises a direction component and a distance component; wherein said incrementally encoding comprises: incrementing the distance component for a current segment of the return routing directive.

Walker teach of incrementally encoding a return routing directive in the message, wherein the return routing directive describes a return route from the destination node to the sending node and comprises at least one segment, and wherein each segment comprises a direction component and a distance component; wherein said incrementally encoding comprises: incrementing the distance component for a current segment of the return routing directive (see claim 53 rejection above).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ the teachings of Walker within the system of Flaig by

implementing incrementally encoding a return routing directive in the message, wherein the return routing directive describes a return route from the destination node to the sending node and comprises at least one segment, and wherein each segment comprises a direction component and a distance component; wherein said incrementally encoding comprises: incrementing the distance component for a current segment of the return routing directive within the method of sending a message in an interconnection fabric because such implementation allows the destination node to return messages back to the source node. Messages such as an acknowledgement message taught by Flaig (see col.4, lines 2-5 and col.9, lines 57-66).

Flaig does not explicitly teach wherein if, after said decrementing, the distance component for the current segment of the routing directive is zero, the method further comprises modifying the direction component of a current segment of the return routing directive and adding a new segment to the return routing directive so that the new segment becomes the current segment of the return routing directive when the message is sent on the selected output port.

Nugent teaches of if, after said decrementing, the distance component for the current segment of the routing directive is zero, the method further comprises modifying the direction component of a current segment of the return routing directive and adding a new segment to the return routing directive so that the new segment becomes the current segment of the return routing directive when the message is sent on the selected output port (see claim 2 and 3 rejections above).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ the teachings of Nugent within the system of Annapareddy by implementing modifying the direction component of the current segment adding the new segment as the current segment when the distance component for the current segment is zero within method of sending a message in an interconnection fabric because by decrementing the directional component to zero allows directional limits to be set thereby triggering a change in directions such as from X-direction to Y or Z-direction.

As per **claim 65**, Flaig and Walker further teaches wherein the return routing directive further comprises a pointer to the current segment, wherein adding a new segment to the return routing directive further comprises moving the pointer to the new segment (see col.11, lines 12-13).

As per **claim 66**, Flaig teaches of a node comprising: a routing unit (see col.1, lines 50-61 and col.4, lines 51-52); a plurality of input ports (see Figs.4-6 and col.1, lines 46-55); and a plurality of output ports (see Figs.4-6 and col.1, lines 46-55); wherein the node is configured to be connected to an interconnection fabric, wherein the interconnection fabric is configured to connect the node to a plurality of nodes (see col.4, lines 51-55); wherein the routing unit is configured to receive a message being sent along a route from a sending node to a destination node in the interconnection fabric (see col.4, lines 55-57 and col.7, lines 33-37); wherein the routing unit is further configured to receive a routing directive encoded (see col.6, lines 14-15) in the message, wherein the routing directive describes the route and comprises at least one

Art Unit: 2155

segment, and wherein a segment comprises a direction component (see col.4, lines 55-57) and a distance component (see col.7, lines 27-33 & 41-48); and wherein the node is configured to receive the message on one of the input ports when the node is not the sending node (see col.4, lines 51-60), wherein the node is further configured to decrement the distance component of a current segment of the routing directive (see col.7, lines 50-52) and to select one of the output ports according to the current segment (see col.4, lines 57-60 and col.7, line 68 to col.8, line 2).

Flaig does not explicitly teach wherein the routing unit is further configured to incrementally encode a return routing directive in the message, wherein the return routing directive describes a return route from the destination node to the sending node and comprises at least one segment, and wherein each segment comprises a direction component and a distance component, wherein in incrementally encoding a return routing directive, the routing unit is further configured to: increment the distance component for a current segment of the return routing directive. Walker teaches such means (see claim 63 rejection above).

Flaig does not explicitly teach wherein if, after said decrementing, the distance component for the current segment of the routing directive is zero, the routing unit is further configured to modifying the direction component of a current segment of the return routing directive and add a new segment to the return routing directive so that the new segment becomes the current segment of the return routing directive when the message is sent on the selected output port. Nugent teaches such means (see claim 63 rejection above).

11. Claim 71 is rejected under 35 U.S.C. 103(a) as being unpatentable over Flaig et al. (US 5,105,424 A) in view of Brantley, Jr. et al. (US 4,980,822 A).

As per claim 71, Flaig teaches of a node comprising: a routing unit (see col.1, lines 50-61 and col.4, lines 51-52); a plurality of input ports (see Figs.4-6 and col.1, lines 46-55); and a plurality of output ports (see Figs.4-6 and col.1, lines 46-55); wherein the routing unit of each node is configured to receive a message being sent along a route from a sending node to a destination node in the interconnection fabric (see col.4, lines 55-57 and col.7, lines 33-37); wherein the routing unit is further configured to receive a routing directive encoded (see col.6, lines 14-15) in the message, wherein the routing directive describes the route and comprises at least one segment, and wherein a segment comprises a direction component (see col.4, lines 55-57) and a distance component (see col.7, lines 27-33 & 41-48); and wherein the node is configured to receive the message on one of the input ports when the node is not the sending node (see col.4, lines 51-60), wherein the node is further configured to decrement the distance component of a current segment of the routing directive (see col.7, lines 50-52) and to select one of the output ports according to the current segment (see col.4, lines 57-60 and col.7, line 68 to col.8, line 2).

Flaig does not explicitly teach that node is a node within a storage system, comprising a plurality of nodes interconnected by an interconnection fabric; wherein different ones of said plurality of nodes perform different functions in the storage system; wherein each one of a first portion of said plurality of nodes is a storage node

comprising at least one mass storage device; and wherein each one of a second portion of said plurality of nodes is a host interface node configured to provide an interface for the storage system to a host computer.

Brantley, Jr. teaches of a node within a storage system, comprising a plurality of nodes interconnected by an interconnection fabric (see title and Fig.1); wherein different ones of said plurality of nodes perform different functions in the storage system (subjective); wherein each one of a first portion of said plurality of nodes is a storage node comprising at least one mass storage device (see abstract: "associated memory module" and Fig.2, #30); and wherein each one of a second portion of said plurality of nodes is a host interface node configured to provide an interface for the storage system to a host computer (see Fig.2, #28 and col.8, lines 38-41).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ the teachings of Flaig with any system whether it is storage, management, or the Internet because such implementation is subjective based on specific need and because such implementation does not patentably distinguish the claimed invention.

Response to Arguments

12. Applicant's arguments with respect to claims 1, 22, and 39 have been considered but are moot in view of the new ground(s) of rejection. Claim 1, 22, and 39 have been rejected as being anticipated by a new prior art, *Annapareddy et al.* (US 5,602,839 A).

Applicant's arguments with respect to claims 21, 38, and 42 have been considered but are moot in view of the new ground(s) of rejection. Claim 21, 38, and 42 have been rejected as being anticipated by a new prior art, *Annapareddy et al.* (US 5,602,839 A).

Applicant's arguments with respect to claims 4, 6, 28, and 29 have been considered but are moot in view of the new ground(s) of rejection. Claims 4, 6, 28, and 29 have been rejected as being unpatentable over *Annapareddy et al.* (US 5,602,839 A) in view of *Nugent* (US 5,175,733 A).

In response to the applicant's argument regarding claims 53, 56, and 59, although *Walker et al.* (US 5,613,069 A) teaches that when a packet "enters the network, ...the routing trailer is null", such statement is not equivalent to "*when sent from the initial sending node*" as recited in the claim. Nothing has yet been sent in the above teachings of *Walker*. *Walker* teaches that, "where the routing header describes where the packet is going, the routing trailer describes where it has come from" (see col.7, lines 62-64). Therefore, *Walker* clearly teaches the limitation of "*wherein the message includes both the routing directive and the return routing directive when sent from the initial sending node*".

In response to applicant's arguments regarding claims 63 and 66, against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Claim 63 and 66 are rejected based on *Flaig et al.* (US

Art Unit: 2155

5,105,424 A) in view of *Walker* et al. (US 5,613,069 A) and *Nugent* (US 5,175,733 A).

Regardless of the “routelet-based mechanism” of *Walker*, *Walker* is only relied upon to teach of a return routing directive. *Flaig* teaches of the segment comprising the direction component and the distance component. With regards to the amended claim recitation, specifically regarding “*wherein if, after said decrementing... output port*”, *Nugent* (US 5,175,733 A) has been relied upon to teach this limitation (see rejections above).

In response to applicant's arguments regarding claim 68, *Walker* et al. (US 5,613,069 A) clearly teaches and/or suggests of returning an error message (see rejection above).

In response to applicant's arguments regarding claim 71, *Brantley, Jr.* et al. (US 4,980,822 A) clearly teaches the missing elements. Regarding the argument of the claim element of “different ones of said plurality of nodes perform different functions in the storage system”, clearly such limitation is subjective and not a limitation “particularly pointing out” or “distinctly claiming” the invention. Clearly a node inherently performs a function. What functions the node performs without specifically claiming the particular function is not a limitation within the claim language and therefore subjective.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

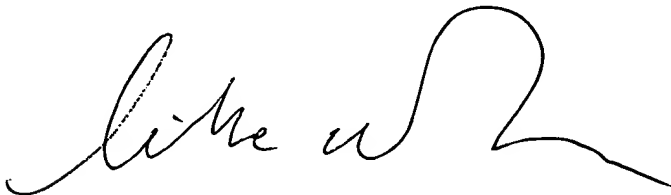
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Y. Won whose telephone number is 571-272-3993. The examiner can normally be reached on M-Th: 7AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Saleh Najjar can be reached on 571-272-4006. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Michael Won

A handwritten signature in black ink, appearing to read "Mike W", with a stylized flourish at the end.

August 18, 2005

Bharon + Barot.
BHARAT BAROT
PRIMARY EXAMINER